CLAIMS

What is claimed is:

1. A method for dynamic media gateway resource management, the method comprising:

at a media gateway for switching voice packets between a plurality of input ports and output ports:

(a) pooling voice server resources provided by a plurality of voice chips in the media gateway;

(b) for each new call/session, dynamically allocating a voice chip from the pooled voice server resources;

(c) dynamically assigning a logical resource identifier to each session;

(d) receiving a plurality of voice packets relating to a call/session from a plurality of different external networks and sending a plurality of voice packets relating to the call/session to the external networks; and

(e) processing voice packets associated with each session using the voice chip dynamically assigned to the session.

2. The method of claim 1 wherein pooling voice server resources includes combining M voice server cards into the shared pool of voice server resources, M being an integer, wherein each voice server card includes N_m voice chips, N_m being an integer representing the number of voice chips on the m^{th} voice server card, and each voice chip is capable of

supporting K_{mn} voice channels, K_{mn} being an integer representing the number of channels of the n^{th} voice chip on the m^{th} voice server card.

3. The method of claim 2 wherein dynamically allocating a voice chip from the pooled voice server resources includes selecting a voice channel from the pool of $\sum_{m=1\_to\_M}\sum_{n=1\_to\_Nm}K_{mn}$ voice channels.

4. The method of claim 2 where N_m and K_{mn} are different for at least some of the voice chips.

5. The method of claim 2 wherein N_m and K_{mn} are the same for all of the voice chips.

6. The method of claim 1 wherein dynamically assigning a logical resource identifier for each session includes assigning a local IP address and UDP port for the media flow of each session.

7. The method of claim 6 comprising dynamically building a voice server resource allocation table indexed by the local IP address and UDP port assigned to each session.

8. The method of claim 6 comprising dynamically receiving via call signaling channel or learning at run-time a remote IP address and a remote UDP port representing a remote endpoint corresponding to each session.

9. The method of claim 1 wherein dynamically allocating a voice chip from the pooled voice server resources includes allocating the voice chip independently of a remote endpoint assigned to each session.

10. The method of claim 1 wherein processing the voice packets associated with each session using the voice chip dynamically assigned to each

session includes performing segmentation and reassembly (SAR) operations for each session.

11. The method of claim 1 wherein processing the voice packets associated with each session using the voice chip dynamically assigned to each session includes performing at least one of echo cancellation, transcoding, tone detection and generation, announcement playout, media recording, and conference bridging.

12. The method of claim 1 comprising multicasting session identifiers associated with each session to a plurality of network interface cards in the media gateway.

13. The method of claim 12 comprising, in response to failure of a route to one of the network interface cards, routing packets associated with a session to its assigned voice chip over an alternate network interface card.

14. The method of claim 1 comprising routing outbound packets associated with each session over a network interface card.

15. The method of claim 14 comprising selecting an outbound network interface card from a pool of network interface cards.

16. The method of claim 1 comprising terminating a data link layer connection associated with each session at one of a plurality of network interface cards within the media gateway and wherein processing voice packets associated with each session using the assigned voice processing resource includes forwarding packets from the network interface card to the voice processing resource using the logical

resource identifier assigned to each session and one or more addresses in each received packet.

17. The method of claim 16 wherein forwarding each packet to the assigned voice processing resource includes forwarding each packet by comparing a destination IP address, destination UDP port combination in each packet to a plurality of destination IP address, destination UDP port combinations assigned to active sessions in the media gateway.

18. The method of claim 16 wherein forwarding each packet to the assigned voice processing resource includes forwarding each packet by comparing a destination IP address, destination UDP port, source IP address, source UDP port combination in each packet to a plurality of local IP address, local UDP port, remote IP address, remote UDP port combinations assigned to active sessions in the media gateway.

19. A system for dynamic media gateway resource allocation on a per session basis, the system comprising:

(a) a plurality of voice chips being pooled in a common resource pool for performing voice processing operations on media packets;

(b) a plurality of network interfaces coupled to the voice chips for forwarding incoming media packets to the voice chips and forwarding outbound media packets from the voice chips to external networks; and

(c) a dynamic resource manager operatively associated with the packet interfaces and the voice chips for dynamically allocating

voice chips from the common resource pool to process new sessions on a per session basis.

20. The system of claim 19 wherein the voice chips are adapted to perform encoding and decoding (CODEC) operations on the media packets.

21. The system of claim 19 wherein the voice chips are adapted to perform segmentation and reassembly (SAR) operations on the media packets.

22. The method of claim 19 wherein the voice chips are adapted to perform echo cancellation and other functions on the media packets.

23. The system of claim 19 wherein the network interfaces include IP network interfaces.

24. The system of claim 19 wherein the network interfaces include TDM network interfaces.

25. The system of claim 19 wherein the network interfaces include at least one of Ethernet, ATM, and MPLS network interfaces.

26. The system of claim 19 wherein each network interface includes a resource allocation table being dynamically constructed from incoming media packets.

27. The system of claim 26 wherein the resource allocation table includes a local IP address and local UDP port combination assigned to each session.

28. The system of claim 27 wherein the resource allocation table in each network interface includes a remote IP and UDP port combination associated with each session.

29. The system of claim 19 wherein the controller is adapted to dynamically assign a session identifier to each new session.

30. The system of claim 29 wherein the session identifier includes a local IP address and local UDP port combination.

31. The system of claim 30 wherein the session identifier includes a remote IP address and remote UDP port combination.

32. The system of claim 29 wherein the controller is adapted to multicast the session identifiers to the network interface cards.

33. The system of claim 32 wherein each network interface is adapted to forward media packets associated with any session to the voice chip assigned to the session using the session identifiers.

34. A computer program product comprising computer executable instructions embodied in a computer readable medium for performing steps comprising:

(a) for each new call/session, dynamically allocating a voice chip from a pool of voice chips to process media packets associated with the session;

(b) dynamically assigning a logical resource identifier to each session;

(c) receiving a plurality of media packets relating to a session from a plurality of different external networks and sending a plurality of media packets relating to the session to the external networks; and

(d) processing the voice packets associated with each session using the voice chip dynamically assigned to the session.

35. The computer program product of claim 34 wherein receiving and sending voice packets includes receiving and sending voice packets over an Internet Protocol (IP) network.

36. The computer program product of claim 34 wherein receiving and sending voice packets includes receiving and sending voice packets transmitted over an ATM, Ethernet, SONET, or MPLS network.

37. The computer program product of claim 34 wherein dynamically allocating a voice chip from a pool of voice chips includes dynamically allocating a channel from a set of $\sum_{m=1\_to\_M}\sum_{n=1\_to\_N_m}K_{mn}$ voice channels, where M is an integer representing a number of voice server cards, N_m is an integer representing the number of voice chips equipped on the *m*-th voice server card, and K_{mn} is an integer representing the number of voice channels of the *n*-th voice chip of the *m*-th voice server card.

38. The computer program product of claim 37 where N_m and K_{mn} are different for at least some of the voice chips.

39. The computer program product of claim 37 wherein N_m and K_{mn} are the same for all of the voice chips.

40. The computer program product of claim 34 wherein dynamically assigning a logical resource identifier to each session includes dynamically allocating a local IP address and local UDP port for each session.

41. The computer program product of claim 40 comprising associating the local IP address and local UDP port with the voice chip assigned to each session.

42. The computer program product of claim 34 wherein dynamically assigning a logical resource identifier to each session includes dynamically receiving via call signaling path or learning at run-time a remote IP address and a remote UDP port representing the remote endpoint in each session.